

sub.
A'

- ical el
ing a m
tical e

- al element.
member is co
n treatment

- sub
A2

- al element
member is c
um layer,
yer and a
al element
a ceramic
the optic

- cal element acc
is composed of
and HfN.

6. An optical element according to Claim 4, wherein the ceramic material is a material that absorbs the wavelength

to be used.

7. An optical element according to one of Claims 1 to 6, wherein an alignment mark is provided on the light-shielding member.

8. An optical element provided with a light-shielding member composed of a light-shielding ink and an alignment mark at the periphery of the optical element.

9. An optical element according to Claim 7 or Claim 8, wherein the light-shielding member and alignment mark are provided by printing.

10. An optical member according to Claim 9, wherein the portions where the light-shielding ink does not protrude.

11. An optical element provided with an effective area and a light-shielding area in the periphery of the effective area, the light-shielding area blocking UV-laser light with a wavelength of 250 nm or less and generating no undesirable substances when irradiated by laser light.

12. An element according to Claim 11, wherein the light-shielding area is composed of at least one of a metal

0930956 091099

Sub.
A3

Sub.
A4

pub. 4
A5

al elem
ding are
yielding
esirable

ment accord
area is con

sub. 7
a 6

ment according
area compris

pub.
A7

ght.
An element
ielding are

18. An element according to Claim 17, wherein the c-shielding area comprises at least one of a metal and a ceramic.

sub.
A8

element prov
area in the
ding area b
ight.
according to
comprises a

pub.
A 9

according
comprises

sub. 610

member comprising an inorganic material at the periphery of an optical element.

24. An optical element according to Claim 23, wherein the material comprises a thin film ceramic.

25. An optical element according to Claim 24, wherein the material comprises at least one of TiC, TiN, ZrC, ZrN, HfC and HfN.

26. An optical element according to Claim 23, wherein the material comprises metallic materials.

27. An optical element according to Claim 26, wherein the material comprises a metal subjected to reflection preventive treatment.

28. An optical element according to Claim 26 or 27, wherein the material comprises at least one of chromium, aluminum, molybdenum, tantalum and tungsten.

29. An optical element according to Claims 26 to 28, wherein the reflection preventive treatment comprises a laminated structure of a metal oxide layer on the light-shielding member.

sub.
all
cond.

An optical element according to the present invention comprises a compound of cerium, thorium, and tungsten, and silicon.

An optical element according to the present invention comprises a semiconductor material comprising silicon, germanium, and tungsten, and silicon.

An optical element according to the present invention comprises a semiconductor material comprising silicon, germanium, and tungsten, and silicon.

An optical element according to the present invention comprises a semiconductor material of the light-shielding material.

An optical element according to the present invention comprises a semiconductor material of the light-shielding material.

oxide.

32. An optical element according to Claims 31, wherein the material comprises a compound of at least one of molybdenum and tungsten, and silicon.

33. An optical element according to Claims 23, wherein the material comprises a semiconductor material.

34. An optical element according to Claims 33, wherein the material comprises silicon,

35. An optical element according to Claims 23, wherein the material of the light-shielding member comprises a metal oxide.

36. An optical element according to Claims 35, wherein the material of the light-shielding member comprises titanium oxide.

37. An element according to any of Claim 1 to 35, wherein a diffractive surface is formed in said effective area.

pub.
Q12
38. An element according to any of Claim 1 to 35, wherein said element is a diffractive optical element.

39. An optical system having the optical element according to one of Claims 1 to 35.

40. An illumination apparatus illuminating a face utilizing the optical system containing the optical element according to any one of Claim 1 to Claim 35.

41. A projection exposure apparatus for illuminating a pattern on a first subject by taking advantage of a light flux via the optical system containing the optical element according to one of Claims 1 to 35, thereby projecting and exposing the pattern on the first subject on a substrate face with the projection optical system.

R/1.12G
42. A method for manufacturing a device, wherein the pattern on the mask is illuminated by taking advantage of the light flux via the optical system containing the optical

